Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

9 December 1963

STAT

Industry Advisory Committee
Attn: [redacted]

Subject: Edge Scan Experiments

In fulfillment of your request during the meeting of 3 December 1963, the following material is presented for the committee's consideration.

Background:

Initial presentations during the second and third committee meetings described the present status and technical approach to post-operation analysis of photographic images by means of scanning edges in the scene. These presentations described the relative newness of the application, some preliminary results both in the laboratory and on mission material, and some of the difficulties and potential dangers.

Requirement:

The chairman requested that Perkin-Elmer and Eastman Kodak representatives prepare a letter for presentation at the next meeting stating the experiments and investigation that would constitute a next logical step in the application of "Edge Scan" as a possible objective measure of quality. It was understood that PE [redacted] would prepare an approach that might develop a measure of correlation with edge trace technique from the thousands of RES readings already available, and EK [redacted] would suggest some experiments to further the edge scanning technique. This latter material is presented below.

STAT

STAT

Development Goals:

Based on our present knowledge and understanding of edge scanning analysis, it appears reasonable to establish the following immediate and long term goals for the spatial frequencies of interest.

1. Establish the reliability of recent experiments.

2. Determine the most promising data handling technique.

3. Measure the variability of existing microdensitometer instruments.

4. Accumulate data from future missions.

5. Determine the practicality of any feasible methods developed.

6. Determine if extending the analysis to past material is warranted.

XERO COPY XERO COPY XERO COPY XE CO

MORI/CDF

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

Experiments and Investigations:

The list below is certainly not all-inclusive and may in some cases be redundant. This preliminary list is submitted in an attempt to obtain the essential information to accomplish the goals above.

1. To establish reliability of recent experiments:

   a.) Perform simulation with sufficient replication to establish variability of the data within and between the three methods of acquiring resolution, i.e. visual resolution, MTF from sine wave targets, and MTF from edge scanning. The resulting MTF curves can be combined with a film modulation threshold curve to predict resolution.

   b.) Measure the Modulation Transfer Function (MTF) of the present microdensitometer slit.

2. To determine most promising data handling technique:

   a.) Perform tests with wider and longer slits (for less noise), being careful to know the measured MTF for each slit size used.

   b.) Perform tests with existing (or modified) "electronic" scanners such as MIT Line Scan and investigate direct display output devices.

   c.) Examine promising data smoothing methods (manual, analog, digital).

3. To measure variability of existing instruments:

   a.) Run sufficient scans on each instrument to determine its own consistency on a standard target.

   b.) With a single set of test objects run edge scans on several different instruments using a common technique and measure variability between instruments. Microdensitometer at EK, IE, Itek, SPPL and NPIC would be suggested.

4. To accumulate data on future missions:

   a.) On the same instrument(s), select and measure edges from all future O/M/J mission material. It is recommended that this be done at a government laboratory responsible for analysis and/or use of output material.

XERO COPY XERO COPY XERO COPY XE CO

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

5. To determine practicality:

a.) Evaluate measurement and data handling practices from the standpoint of man-hours required per edge. The best technique may be of little value if it is too cumbersome for "production" use.

6. To consider extending analysis to past materials

a.) On the basis of results in 1 through 4 above it may be advisable to re-evaluate some past C/M/J mission material in order that it may be related on a common scale with the material from 4.

Status:

Certain of the experiments proposed above were obvious enough to be started immediately. Both 1a and 1b are already in progress on our own microdensitometers. Test 2a is planned for the near future. 2b would depend on the availability of other equipment such as that at MIT. Data smoothing in 2c is being pursued in the manual and digital form at EK. This is the type of investigation that could be done in parallel at several laboratories.

Test 3a has been initiated on two of our instruments. 3b has not yet been started, but PE and SPPL have already volunteered the use of their microdensitometers for this test. We would be happy to furnish the targets that were used in the simulation experiment.

Test 4a (mission edges) has not been initiated in any formal way. EK plans to continue measuring a modest number of edges under an existing contract to aid in developing the technique. If any large scale measurement program is to be performed it should be done by NPIC or SPPL, but no conclusions should be drawn from the measurements, i.e. do not consider it a formal evaluation tool, until the technique and its shortcomings are well understood and the decision has been made that it can serve a useful purpose.

Test 5 has not been started. After feasible techniques are developed, they should be tested to determine the elapsed time required by each.

Undertaking test 6 on past material should be considered only in the light of significant positive results from tests 1 through 5.

XERO COPY XERO COPY XERO COPY XE CO

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7

Summary:

These investigations are suggested as the next step in evaluating the edge sum technique. They are certainly not the sum total of all tests that could or should be run, but they should provide information that would either (a,) help substantiate the accuracy of the technique as a useful tool, or (b,) uncover areas in need of refinement and/or further testing. We would be participating in predicting the outcome at this time, but the development would be unusual one if all our questions were answered at the end of the second series of tests.

[redacted]

[redacted]

Orig. + 2:

STAT

STAT

XERO COPY XERO COPY XERO COPY XE CO

Approved For Release 2006/12/04 : CIA-RDP79B00314A000500030007-7